FACT SHEET FOR STATE WASTE DISCHARGE PERMIT NO. ST-9059

MERCER RANCH

SUMMARY

Mercer Ranch owns and operates a carrot fresh pack processing facility in Klickitat County, Washington. The facility is presently operated under a State Waste Discharge Permit that regulates land application of the processing facility wastewater.

The highest volume of discharge reported by the facility during the past permit cycle was 19.7 MG for the month of July 2002. Based on the data provided, the Department estimated over 50 MG of wastewater would have infiltrated to ground in 2002. The Department believes, subsequent to a site visit and discussion with the Permittee, that this estimation is based upon erroneous data. The Permittee is required to install reliable flow meters at its two discharge points in order to derive an accurate wastewater balance between sedimentation pond input and sprayfield output.

Mercer's wastewater discharge is high in the constituents, BOD, total dissolved solids and nitrate. Although the wastewater has some degree of treatment, a recirculating pond and sedimentation pond equipped with a rotoshear, lysimeter sampling has demonstrated a reasonable potential to degrade ground water quality exists. TDS, nitrate and chloride levels found below the root zone, (Vadose zone), experienced marked increases beginning in 2000. The Department believes this was largely due to the failure of the Permittee to review the analytical data in a timely manner and act upon that information. The Permittee is required to institute BMPs immediately to mitigate this potential to contaminate ground water and incorporate the BMPs into its Operation and Maintenance Manual. Furthermore, the criteria of the Annual Crop and Soil Monitoring Report and Discharge Monitoring Report, (DMR) have been revised. This will require the Permittee to better organize and conduct analysis of the data in detail, which will enable the Permittee to adaptively manage operations necessary to reduce the potential to contaminate ground water.

The engineering report previously submitted to the Department by Mercer Ranch provided a comprehensive plan to utilize its wastewater beneficially and to protect ground water quality. Mercer Ranch is required to land apply its wastewater at the proper agronomic rates for beneficial use, in accordance with Appendices A, B and C of the engineering report. Data analysis indicates that the system, as currently operated, is not sufficiently protective of ground water quality. This permit requires Mercer Ranch to submit an updated engineering report with an All Known and Reasonable Technology (AKART) analysis. The AKART analysis should address water use and methods to reduce contaminants; evaluate the potential for groundwater contamination at the sedimentation pond and sprayfield, and characterize the cation/anion balance in the Fixed Dissolved Solids, (FDS), fraction of the wastewater. The analysis should also investigate the elimination of or provide demonstration of beneficial use of "out of season" sprayfield wastewater applications and propose a monitoring plan and schedule that will assure representative sampling during all phases of operation.

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INTRODUCTION

This fact sheet is a companion document to the State Waste Discharge Permit No. ST-9059. The Department of Ecology (the Department) is proposing to issue this permit, which will allow discharge of wastewater to ground waters of the State of Washington. This fact sheet explains the nature of the discharge, the Department's decisions on limiting the pollutants in the wastewater, and the regulatory and technical bases for those decisions.

Washington State law (RCW 90.48.080 and 90.48.162) requires that a permit be issued before discharge of wastewater to waters of the state is allowed. Regulations adopted by the state include procedures for issuing permits (Chapter 173-216 WAC), and water quality criteria for ground waters (Chapter 173-200 WAC). They also establish requirements which are to be included in the permit.

This fact sheet and draft permit are available for review by interested persons as described in Appendix A--Public Involvement Information.

The fact sheet and draft permit have been reviewed by the Permittee. Errors and omissions identified in these reviews have been corrected before going to public notice. After the public comment period has closed, the Department will summarize the substantive comments and the response to each comment. The summary and response to comments will become part of the file on the permit and parties submitting comments will receive a copy of the Department's response. This fact sheet will not be revised. Changes to the permit will be addressed in Appendix D--Response to Comments.

GENERAL INFORMATION	
Applicant:	Mercer Ranch
Facility Address:	Corner of Sonova and Alderdale Roads Klickitat County, WA
Type of Facility:	Carrot Processor
Types of Treatment:	Sedimentation Pond and Land Application
Location of Discharge to Sedimentation Pond:	Latitude: 45° 52' 45" N Longitude: 119° 54' 15" W.
Legal Description of Application Area:	Sections 23, 26, 34, 35, Township 5 N, Range 23 E. W. M.
Contact at Facility:	Name: Keith Price Phone No: 509-894-4773

BACKGROUND INFORMATION

DESCRIPTION OF THE FACILITY

Mercer Ranch is a large carrot-growing and -processing operation located in the northeast corner of Klickitat County, Washington. Approximately 36,000 tons of carrots per year are processed and packaged for the retail market. Production is expected to expand dramatically during the permit cycle.

The permit application indicates the carrot processing season begins about July 1st and ends about December 1st. The plant processes carrots 6 days a week. Presently, the processing plant employs approximately 130 people, organized into two shifts.

History

Until the early-1980's, the property was used to grow dryland crops and raise sheep. Mercer Ranch then began to focus its agricultural efforts on large-scale production of carrots. During the mid-1980's a carrot processing facility was constructed onsite.

Production Processes

Fresh carrots are brought from the field, temporarily stored in the soaker shed, and then moved to the receiving area. They are then unloaded, washed, and transported through a flume. Carrots are then sorted in the primary sizer. Depending on market demand, some carrots are packaged for market. Carrots to be further processed pass over a secondary sizer, and flow to either the cello plant or the cut plant. Product from the cello plant is sent to market. From the cut plant,

carrots are either packaged for market or sent to the peel plant. After peeling, product is packaged and sent to market.

Treatment Processes

Separate wastewater streams are generated by unloading, washing, peeling and raw product operations. Wastewater generated during unloading is recycled in the recirculation pond north of the raw product processing building. The pond is "U" shaped, about 1 acre-foot in capacity, and is designed to settle out larger (sand-size) particles. Silt and finer sized particles may settle in this pond when process lines are shut down.

Wastewaters generated from the peeling and raw product operations are combined with wastewater streams from the unloading and product washing operations. This combined wastewater stream is then sent through a rotoshear water cleaner. The rotoshear is a cylindrical rotating drum screen with a slot opening of .020 inches.

Wastewater is then discharged to a sedimentation pond, which is much larger than the pond mentioned above. This pond is 10 feet deep, with a storage capacity in excess of 50 acre-feet. Based on an inflow of 186 gallons per minute, retention time of wastewater in the pond will be approximately 73 days.

The sediment and biological oxygen demand reduction efficiency of this pond depend on several factors. During the summer months of operation, the water level is low because of high irrigation requirements. During the autumn months, when irrigation requirements are relatively low, water must be stored in the pond until the following spring.

Distribution System and Sprayfields

Mercer Ranch has set aside Circles 7, 8, and 9 for its land application program. Each of the circles is approximately 125 acres in area. Initially, Circle 7 has been used for land application; Circles 8 and 9 will be required to be added because hydraulic or nutrient loadings have exceeded the capacity of Circle 7. Circles 7 and 8 are currently piped to convey wastewater; Circle 9 can be connected within a few hours. Each of the circles, in future years, may be subdivided into 2 subfields to allow greater flexibility in crop management.

Circle 7 has received nearly 100% of the wastewater discharge. The irrigation machine used on the field is an electric drive, center pivot. The system has been retrofitted with drop-tube sprinklers. Sprayfields are irrigated at a flow rate of 970 gallons per minute. One full rotation of the center pivot sprinkler takes approximately 24 hours, although this rate can be adjusted as necessary. An irrigated buffer zone of poplar trees has been planted around the field. The buffer is expected to decrease wind erosion and errant wastewater spray loss.

In the last permit term, wastewater was planned not be applied to Circles 8 and 9 until the hydraulic or nutrient loading capacity of Circle 7 was exceeded. Lysimeter sampling has shown dramatic increases in Total Dissolved Solids, (TDS), Nitrate and Chloride in the 2002-2001 time frame. The levels found continue to be well above ground water criteria. This condition necessitates the Permittee to re-evaluate its Engineering Report in the next three years and review its Operations and Maintenance procedures to develop a quick response to the increasing concentration of contaminants discovered in the lysimeters and reduce the current levels below the Vadose zone. Monitoring shall continue in fields where wastewater discharge has been suspended until, upon the request of the Permittee, approval has been granted by the Department to suspend monitoring following review of the data.

According to preliminary soil survey maps compiled by the National Resources Conservation Service, "sprayfield soils are predominantly silty or sandy loam, with a loess origin varying chiefly by the slope of the field and the degree of reworking following deposition. These soils are conducive to land application of wastewater. They are sufficiently permeable to prevent ponding and surface runoff under intensive irrigation, yet have enough fines to prevent excessive losses from the root zone". Ponding has proven to be a recurring problem however, according to the DMR record.

On August 14, 1997, prior to land application of any wastewater, baseline soil samples were taken with an auger within the sprayfield circles. Samples were taken to establish the presence or absence of naturally occurring ferrous iron. No ferrous iron was observed in the samples.

GROUND WATER

The depth to ground water in the Mercer Ranch area is reported in two water well reports which were submitted with the permit application. The reports indicate static water levels of 200 feet and 300 feet below the tops of the wells. The permit application suggests that, based on the depth to ground water, flow is probably to the south, towards the Columbia River.

PERMIT STATUS

An application for permit renewal was received and accepted by the Department on January 2, 2003.

WASTEWATER CHARACTERIZATION

Table 1 compares the concentration of pollutants in the treated wastewater prior to land application to that entering the sedimentation pond from the processing plant.

Table 1: Wastewater Characterization

Parameter	Concentration in mg/L	
	Irrigation Pivot (prior to land application)	**Process Effluent (entering pond)**
Total Kjeldahl Nitrogen (TKN)	14.8	23.4
Soluble Biochemical Oxygen Demand (BOD_5)	608.8	1065
pH	4.7	6.6
TDS	601.8	1113
TSS	152.5	723
Chloride	28.5	30.4
Total Iron	5405	4648

PERMIT LIMITATIONS

State regulations require that limitations set forth in a waste discharge permit must be either technology- or water quality-based. Wastewater must be treated using all known, available, and reasonable methods of prevention, control and treatment (AKART) and not pollute the waters of the State. The minimum requirements to demonstrate compliance with the AKART standard were determined in the engineering report submitted with the permit application, dated April 1997, in conformance with *Guidelines for the Preparation of Engineering Reports for Industrial Wastewater Land Application Systems*, May 1993.

This permit maintains the previous permit limitations on the quantity and quality of the wastewater applied to the sprayfield based on soluble biological oxygen demand, (soluble BOD). These limits will remain in effect during the course of this permit cycle to enable the Permittee to update its engineering report and develop BMP's based upon the data to date and include an assessment of mitigation steps to be taken during this permit cycle. The approved engineering report includes specific design criteria for this facility. Water quality-based limitations are based upon compliance with the Ground Water Quality Standards (Chapter 173-200 WAC).

Discharges to the sprayfield shall be subject to the following limitations:

EFFLUENT LIMITATIONS	
Parameter	**Average Monthly Loading**
Hydraulic Loading	15,000 gallons/acre/day [a]
Soluble BOD_5	32 lbs/acre/day [b]

[a] The average monthly hydraulic loading is defined as, the total quantity of wastewater applied to each sprayfield in gals/acre, divided by the number of days in the month.

[b] The average monthly loading for soluble BOD_5 is defined as, the total quantity of soluble BOD_5 applied to each sprayfield in lbs/acre, divided by the number of days in the month. Total quantity of soluble BOD_5 means the average of the last two samples taken from the sedimentation pond.

The more stringent of the water quality-based or technology-based limits are applied to each of the parameters of concern. Each of these types of limits is described in more detail below:

TECHNOLOGY-BASED EFFLUENT LIMITATIONS

All waste discharge permits issued by the Department must specify conditions requiring AKART to apply to all wastewater discharges to waters of the state (WAC 173-216-110).

It was the judgment of the Department, that the wastewater constituent that posed the greatest threat to ground water quality was soluble BOD due to the potential of excess amounts to create anaerobic conditions leading specifically to the mobilization of iron. Lysimeter monitoring below the vadose zone at crop circle 7 has shown significant increases in the concentrations of TDS, chloride and nitrate during the last permit term. These levels are well above Washington State Groundwater Standards. It is clear that the assumptions contained in the 1997 engineering report and the Department did not accurately model the conditions of operation and the application of wastewater to land sufficiently to protect groundwater quality. Therefore, the Permittee will be required to update the engineering report, to include an AKART analysis with special attention to pollution prevention and reevaluate the potential for groundwater contamination at the sprayfield and from the sedimentation pond.

Flow

Wastewater flow rates are discussed in this section in two contexts: flow into the sedimentation pond, and flow rate of wastewater application to the sprayfields. The former is used to frame processing plant discharges, and the latter to calculate sprayfield loading rates.

Sedimentation Pond Water Balance

Flow from the processing plant to the sedimentation pond in the 2002 was approximately 120 million gallons, (MG). Allowing for evaporation and infiltration losses as predicted in the Permittee's 1997 engineering report, this will leave over 93 MG of wastewater available for crop irrigation. One concern of the Department is that water being held in the pond. The record indicates that the processing operation is generating wastewater throughout the year. A considerable amount of wastewater is generated when the evaporation rate is low (November-February). Any losses then are attributable to infiltration. Furthermore, the application of wastewater to land during the winter months of January, February, November and December violates the 1997 engineering report and the rules of argonomic application as spelled out in Appendix B of that report.

In Appendix B of the 1997 engineering report two hydraulic loading scenarios are presented. One based on the then present rate of production and the other based on expansion of the carrot processing plant. The report stated that the production facility was discharging approximately 186 gallons per minute (gpm) to the sedimentation pond. After expected leakage and evaporation losses of approximately 41 gpm during a detention time of "a few days," 145 gpm of wastewater would remain. This was calculated to result in a total of 20.6 MG of wastewater, generated during a "five month" carrot processing season, to be land applied. Figure 1 on page 12, depicts the actual times when the plant is in operation and the amount of wastewater discharged. The minimum projected annual irrigation requirement for Circle 7 was reported to be 81 MG (p. B2 of the engineering report). Therefore, one sprayfield circle could accommodate the annual wastewater flow from the processing plant, *provided* application of any other wastewater constituents did not exceed agronomic rates.

The report went on to state that if the production capacity is expanded to the extent forecasted the processing facility will discharge approximately 600 gpm of wastewater. After leakage and evaporative losses are incorporated into calculations, the total quantity of wastewater to be land applied will be approximately 86.2 MG annually (p. B2). (At this point the sedimentation pond will be at its maximum storage capacity of 17.2 MG).

The 2002 DMRs indicate that in that year over 119 MG of process water was piped to the sedimentation pond. 53.6 MG of the water was used for irrigation. The difference then is 65.8 MG, which was either evaporated or percolated to ground. The 1997 engineering report (p. 23) estimates evaporative losses in the 10 acre sedimentation pond to be approximately 8.2 MG a year or approximately 20% of the flow at that time. Assuming the larger of the evaporative estimations, (8.2 MG vs. 65.8 MG X .20 = 13.2 MG), there was potentially 52.6 MG during the course of 2002 infiltrating to ground. Mercer Ranches estimates 13 MG of carryover process wastewater remains in the pond as of January 2003, which would indicate 39.6 MG of process wastewater may have leached into the soil column. Mercer Ranch and the Department suspects these estimations are based on faulty flow data. Therefore, installation of flow meters, quality assurance of the data and routine maintenance are requirements of this permit.

The Permittee is required to install continuous recording flow meters at the inlet of the sedimentation pond and on the pivot at the sprayfields as part of the engineering report update and AKART determination.

Table 2: Potential Infiltrate Based on Sedimentation Pond Water Balance in Million Gallons

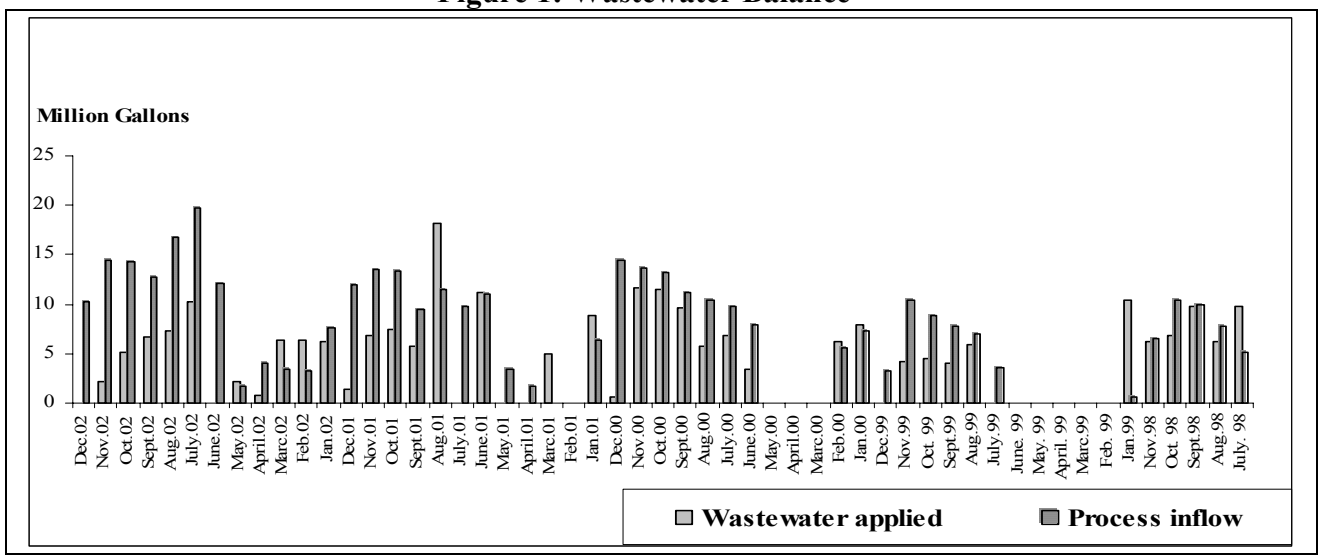
Year	Waste Inflow	Irrigation Outflow	Difference	Potential Infiltrate
2002	119.4	53.6	65.8	52.6 [1]
2001	92	64.6	27.3	19.1 [2]
2000	93.4	63.8	29.6	21.4 [2]
1999	40.9	18.7	22.2	14 [2]
1998	40.3	49.3	- 8.93	-

[1] Based on subtracting the 20% evaporative rate
[2] Based on subtracting the larger of the two evaporation estimates 8.2 MG rather than 20%

Figure 1 demonstrates that not only is the production season greater than five months as stipulated in the application. It demonstrates that the wastewater is being generated at a rate beyond the holding capacity of the sedimentation pond. This apparently necessitates sprayfield applications out of season thereby allowing "untreated" wastewater to percolate. The Department is concerned that untreated wastewater is infiltrating at two sources, the sedimentation pond and the sprayfield.

Recent DMR submittals from the first quarter of 2003 report a 6 MG flow in one month from the process plant to the sedimentation pond. This flow occurred when the plant was reported not in operation. The required O&M update shall incorporate what steps the Permittee can take immediately to address storm water flow into the sedimentation pond, out of season wastewater applications, and a quick response to rising contamination levels found below the vadose zone at Circle 7. It is expected that the engineering report update, due in 2006, will incorporate some of the measures adopted by the facility in the O&M Manual, while providing additional strategies and new procedures based on more in-depth study and engineering.

Figure 1: Wastewater Balance



Soluble BOD_5

Soluble BOD_5 is easily carried with percolating water to depths below the root zone of cover crops. When soluble BOD_5 is present below the root zone, the wastewater treatment process is bypassed, and wastewater is not beneficially used. Once aerobic bacteria deplete subsurface oxygen, soluble BOD_5 quickly becomes food for anaerobic bacteria. A common byproduct of anaerobic bacteria respiration is the mobilization of iron that was previously bound to soil particles. Once mobilized, iron can be carried downward to the aquifer, potentially contaminating ground water. Prevention of subsurface iron mobilization is a concern of this permit.

Sedimentation Pond Loading

The Department is concerned that over the long term soluble BOD, nitrate, TDS and chloride could be transported through the bottom of the pond. Nitrate is believed not to be a problem in the sedimentation pond due to bacterial reduction, but this has not been verified. The AKART determination shall address and determine any potential impact to ground water quality caused by infiltrate from the sedimentation pond and sprayfield.

In the Best Professional Judgment, (BPJ), of the Department's Engineer, soluble BOD in not posing a problem however, it is understood that excesses of soluble BOD can create anaerobic conditions below the vadose zone, which may lead to precipitation of iron, or other minerals, and the eventual degradation of ground water quality. The permit application reports an average soluble BOD concentration of 608.8 mg/l which corresponds to the average value of 644.2 mg/L

reported at the pivot for 2002. The process wastewater flowing to the pond however averaged 1065 mg/L for 2002. Therefore it is reasonable to assume that the average soluble BOD loading of the sedimentation pond lies between the concentration of the process effluent and that found at the irrigation pivot. Appendix B of the engineering report states that, assuming a soluble BOD concentration of 473 mg/L that will remain constant with increased water use and production, soluble BOD loading to the sedimentation pond will range from 753 to 2,860 lbs/day, at 145 and 551 gpm, respectively. Replacing the engineering report value with 608.8 mg/L level reported in the application, the estimated loading to the pond at 551 gpm is 3,681 lbs/day. Basing the calculation with the 2002 DMR's average soluble BOD content of the discharge from the processing plant, the loading to the pond is 6439.6 lbs/day.

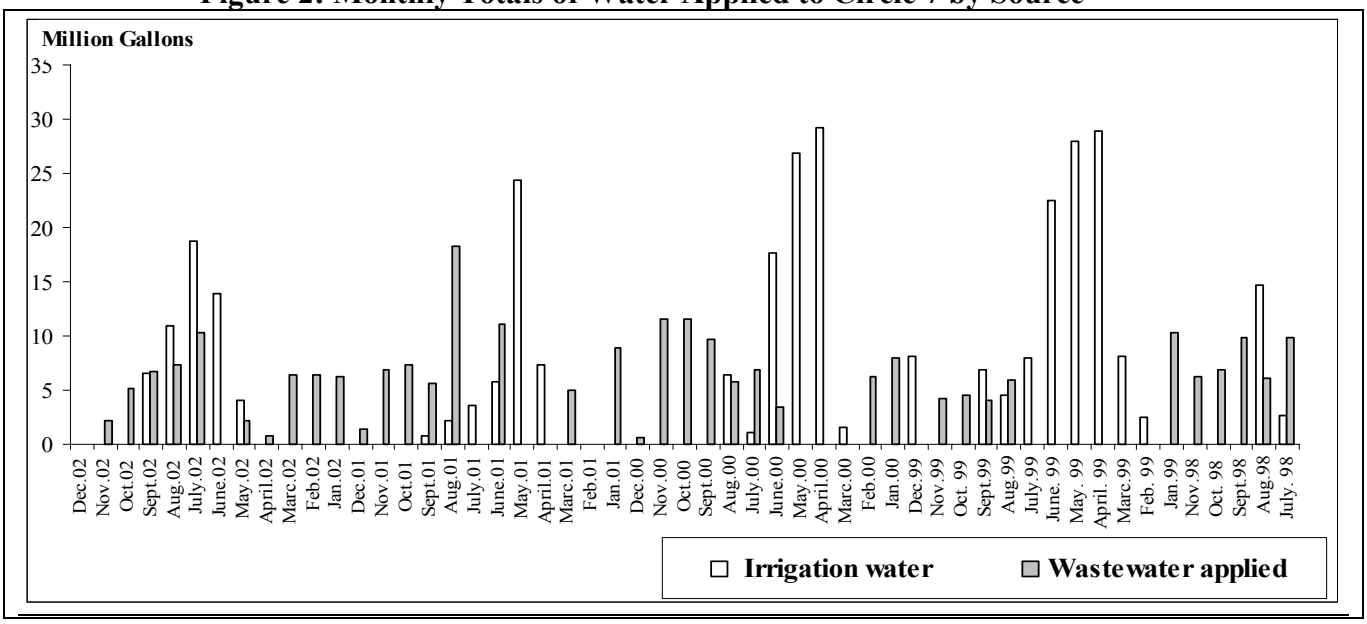
Sprayfield Hydrologic Loading

Water is typically applied to a sprayfield at a rate of 970 gpm, with one complete rotation around a circle taking approximately 24 hours. Total volume of water applied, over a 24 hour period, is 1,396,000 gallons. The application rate, assuming a 125 acre circle, is approximately 11,174 gallons per acre per day (see Appendix C of this fact sheet for calculations).

Sprayfield circles are typically irrigated on the following schedule: wastewater application for 5 days, followed by 5 days of fresh water application or no irrigation, depending on the needs of the crop. When the availability of wastewater is not sufficient to satisfy the needs of the crop growing in the sprayfields, flow will be augmented with fresh water.

It is clear from Figure 2, page 14, that operations have continued beyond the five month estimated period of operation and that application of wastewater to land is being conducted out of the growing season. The Permittee will review its O & M Manual and Procedures and provide the Department with an update engineering report to address this issue.

Figure 2: Monthly Totals of Water Applied to Circle 7 by Source



Sprayfield Loading

Using the Best Professional Judgment of the Department, it is believed that an average application rate of up to 15,000 gallons/acre/day and 32 lbs/acre/day soluble BOD will allow for crop management flexibility; yet provide adequate protection of ground water. The design criteria are lower than this limit. It is the determination of the Department this will not cause over-loading of soluble BOD to occur, due to current soil conditions. This Best Professional Judgment determination was made by the Department's Central Regional Office water quality hydro-engineer, based on experience gained with previously permitted sprayfields. This determination was based on a five month operating season for the facility and the application of wastewater to land at argonomic rates. As these conditions are not currently met, the Permittee is required to address other contaminate loading and the system Design Criteria in an update to its engineering report.

Assuming the average concentration as reported on the application at 604 mg/L soluble BOD, and a volume of 1,396,800 gallons of wastewater applied to a sprayfield over a 24 hour period, the loading rate of soluble BOD is approximately 56.6 lbs/acre/day (see Appendix C of this fact sheet for calculations). Wastewater is applied for a duration of 5 days, then for 5 days, either fresh water is applied or no water at all, depending on crop need. Therefore, over a 10 day rotation, approximately 28.3 lbs/acre/day of soluble BOD is now being applied to the sprayfield.

Table 2: Technology-based Limitations

Parameter	Average Monthly Limitation
Flow	15,000 gallons/acre/day [a]
Soluble BOD_5	32 lbs/acre/day [b]
[a] The average monthly hydraulic loading is defined as, the total quantity of wastewater applied to each sprayfield in gals/acre, divided by the number of days in the month.	
[b] The average monthly loading for soluble BOD_5 is defined as, the total quantity of soluble BOD_5 applied to each sprayfield in lbs/acre, divided by the number of days in the month. Total quantity of soluble BOD_5 means the average of the last two samples taken from the sedimentation pond.	

The following permit limitation, in the form of a best management practice, is necessary until the AKART determination and updated engineering report is approved by the Department:

Land application- The Permittee is required to land apply process wastewater generated by the facility in accordance with the engineering report submitted to, and approved by, the Department. Appendix A, *Rules of Application*, contains narrative operating principals to be followed in utilizing the sprayfield. Appendix B, *Hydraulic, Fertilizer, and BOD_5 Loading Calculations,* details methods of determining the loading capacity of sprayfields for relevant wastewater parameters. The Permittee is required to develop a crop management plan before each irrigation season to identify the specific needs of each crop and assure beneficial use of wastewater. Appendix C, *Agricultural and Environmental Monitoring and Reporting Activities,* describes the monitoring and reporting activities required to document environmental compliance and assist in the agricultural management of the project.

Essentially, Appendices A, B, C serve as a comprehensive set of agricultural best management practices to assure beneficial use of the facility's process wastewater and, at the same time, protect ground water quality. Appendices in the engineering report provide a framework of the maximum assimilative capacities of the wastewater collection and treatment system.

The annual Irrigation and Crop Management Report will serve as the primary indicator of Mercer Ranch's planning for proper utilization of wastewater for the upcoming year. Hydraulic and nutrient loadings forecast in the Irrigation and Crop Management Report must fit within the framework of the existing and forthcoming updated engineering report, but may vary in response to crop management needs.

GROUND WATER QUALITY-BASED EFFLUENT LIMITATIONS

In order to protect existing water quality and preserve the designated beneficial uses of Washington's ground waters including the protection of human health, WAC 173-200-100 states that waste discharge permits shall be conditioned in such a manner as to authorize only activities that will not cause violations of the Ground Water Quality Standards. Drinking water is the beneficial use generally requiring the highest quality of ground water. Providing protection to the level of drinking water standards will protect a great variety of existing and future beneficial uses.

Applicable ground water criteria as defined in Chapter 173-200 WAC and in RCW 90.48.520 for this discharge include the following:

Table 3: Ground Water Quality Criteria

Total Coliform Bacteria	1 Colony/ 100 mL
Total Dissolved Solids	500 mg/L
Chloride	250 mg/L
Sulfate	250 mg/L
Nitrate	10 mg/L
pH	6.5 to 8.5 standard units
Manganese	0.05 mg/L
Total Iron	0.3 mg/L
Toxics	No toxics in toxic amounts

The Department had previously reviewed existing records and was unable to determine if background ground water quality was either higher or lower than the criteria given in Chapter 173-200 WAC; therefore, the Department used the criteria expressed in the regulation in the permit. The discharges authorized by this permit were not expected to interfere with beneficial uses.

In Appendix C of the engineering report, Section 6.0, the Permittee was to monitor the ground water quality quarterly from a nearby well located approximately 200 ft south of irrigation circle #7 in the NW ¼ of the NW ¼ of Section 35, Twn 5, R 23 E, W.M. This sampling did not occur. The engineering report, on page 40, contains the analytical results of samples taken from the Mercer Water Users Association Well #2, (aka Karma Water District Well), on April 13, 1994. Table 4 compares the levels of selected contaminants found at that well against the Washington State Ground Water Criteria and the levels of contamination found at the lysimeters located in Circle 7.

Table 4: Ground Water Criteria vs. Well Water Analysis

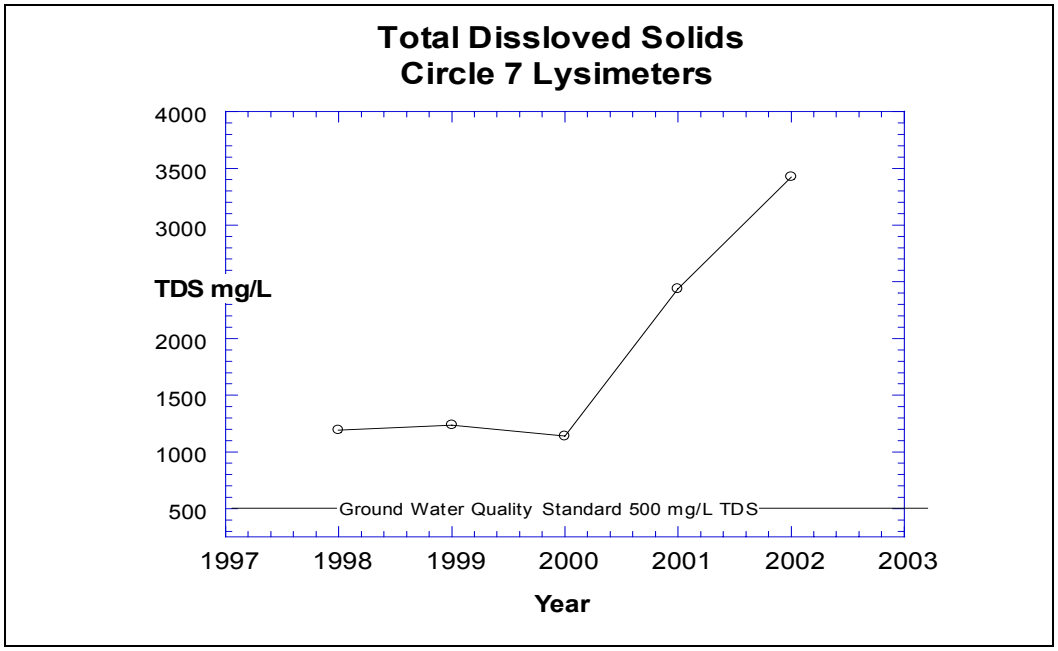
Parameter	Water Quality Standard mg/L	Well Analytical Result mg/L	2002 Average Lysimeter Concentration mg/L
Total Dissolved Solids	500	244	4022
Chloride	250	20.5	352
Sulfate	250	37	NA
Nitrate	10	> 0.5	459
Manganese	0.05	0.019	NA
Total Iron	0.3	0.05	0.137

The Permittee will be required to monitor Mercer Water Users Association Well #2 and report the results to the Department quarterly (condition S2.A.)

TOTAL DISSOLVED SOLIDS

Figure 3 depicts total dissolved solids obtained from lysimeters located in Circle 7 for the past five years. The TDS level experienced a dramatic increase following 2000. The 2002 average is approximately 7 times the Ground Water Quality Standard.

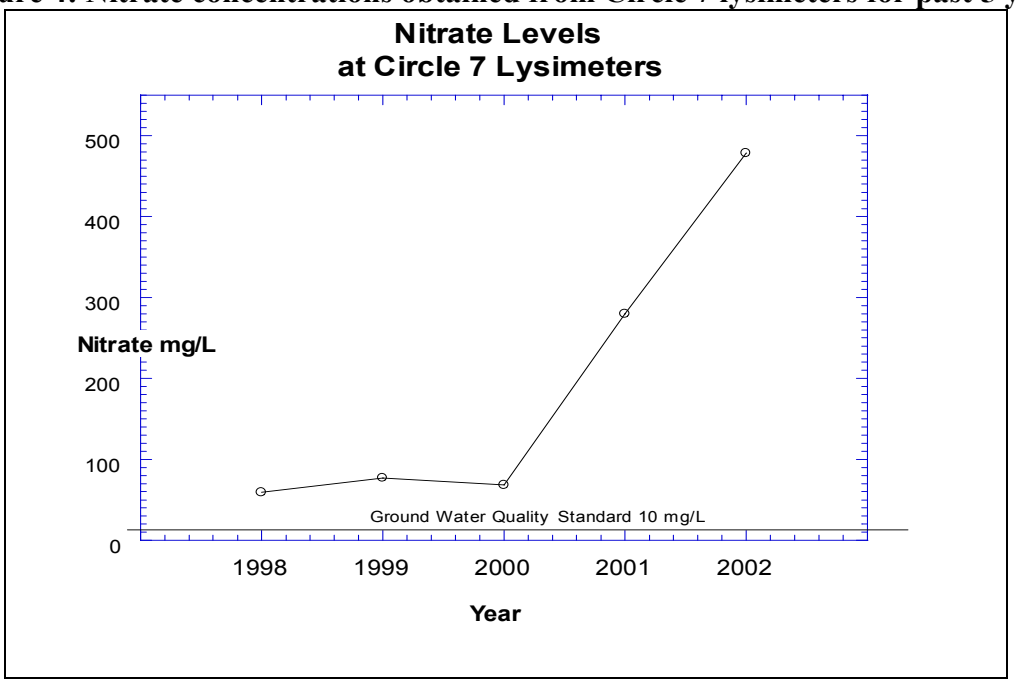
Figure 3: Total Dissolved Solids concentrations obtained from Circle 7 lysimeters for past 5 years.



NITRATE

The 2002 average nitrate concentration obtained from lysimeters placed in Circle 7 is 459 mg/L, over 45 times the Water Quality Standard. Figure 4 depicts the nitrate data collected over the past permit term from 1998 to 2002. The record demonstrates a dramatic increase in nitrate levels during the year 2000.

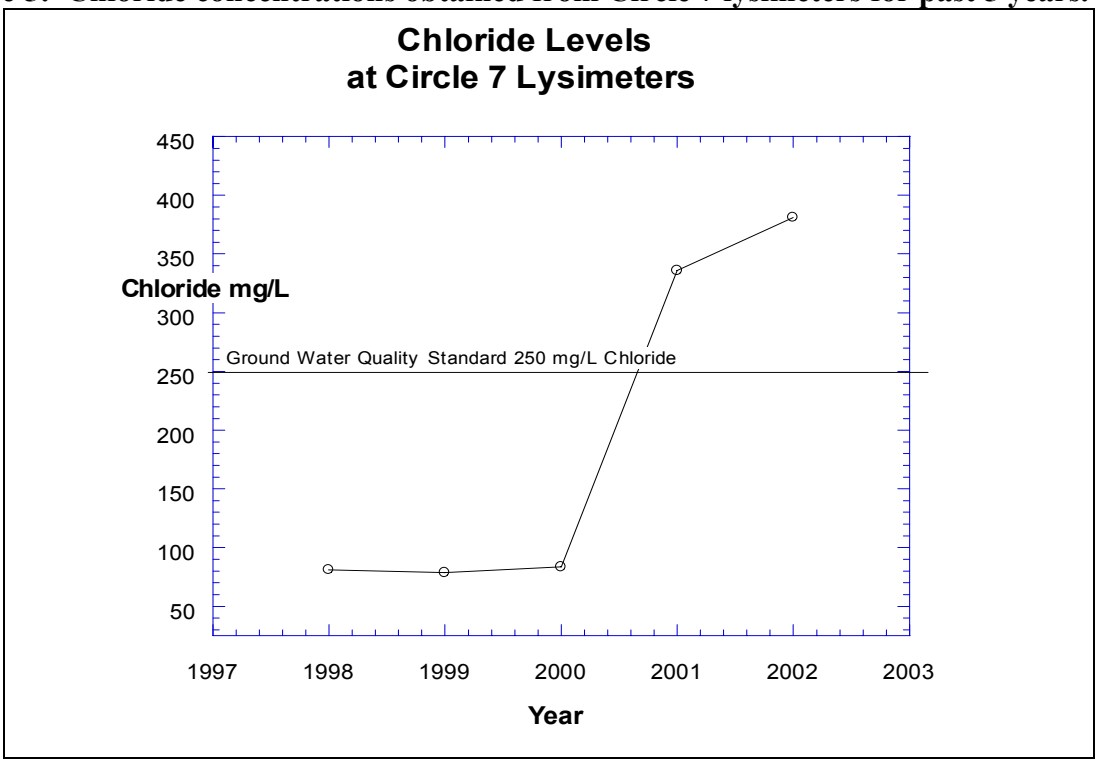
Figure 4: Nitrate concentrations obtained from Circle 7 lysimeters for past 5 years.



CHLORIDE

The 2002 average chloride concentration has reached 1.5 times the ground water standard. Figure 5 clearly shows the dramatic increase in chloride during the year 2000.

Figure 5: Chloride concentrations obtained from Circle 7 lysimeters for past 5 years.



CHLORIDE, NITRATE AND TDS ENRICHMENT OF SOIL PORE WATER

During the year 2000, there was a sharp increase of chloride, nitrate and TDS found at or below the vadose zone. In 2000, if the data are correct, the total amount of wastewater applied increased three-fold from 18.7 MG in 1999 to 63.8 MG in 2000. The amount of irrigation water delivered remained relatively constant between 1999 and 2000, but in 2001 irrigation water application dropped significantly, from 97 MG to 41 MG. The total amount of wastewater applied out of season in the winter of 1999-2000 was18.4 MG. That amount increased to 21.2 MG during the winter of 2000-2001.

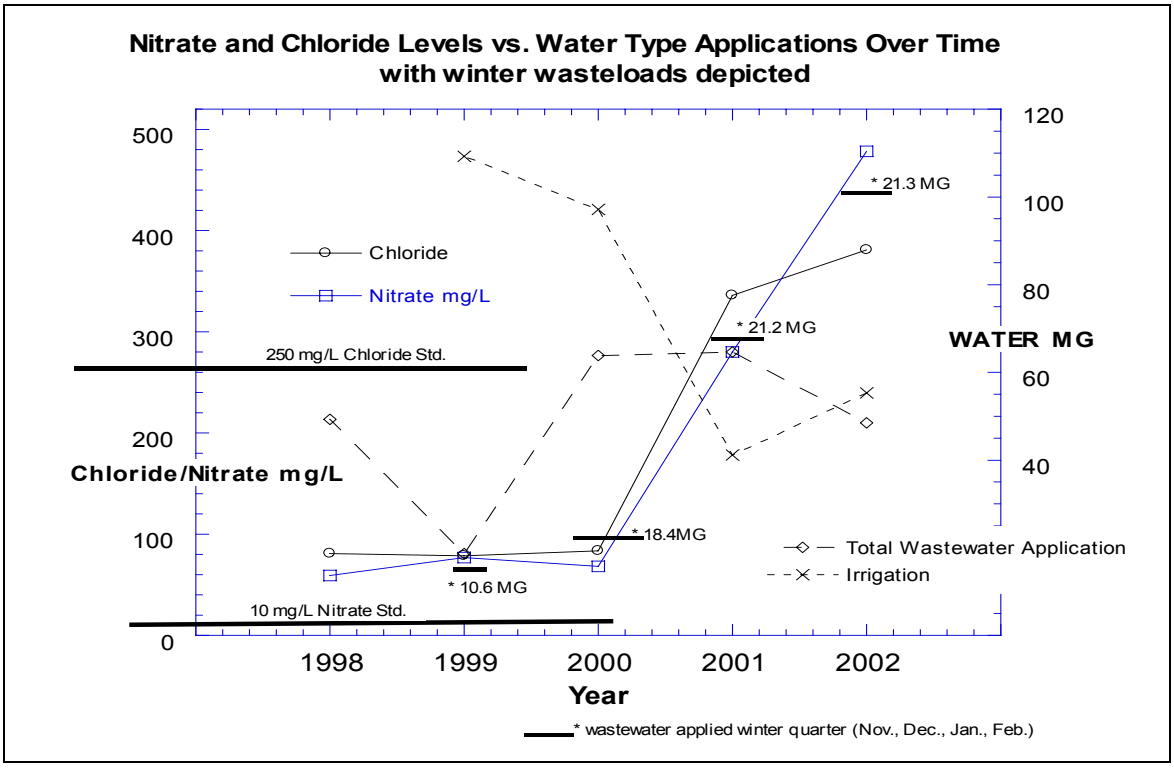
It is unfortunate that lysimeter data before 1998 is either missing or non-existent. These data would provide information in determining background within Circle 7. The data available indicate that when irrigation water application is high constituent concentrations appear to

remain relatively stable in spite of out of season wastewater discharges and increasing wastewater discharge.

The Department believes the practice of reduced irrigation water and increased waste load was exacerbated by the application of wastewater during the winter months. The practice has led to the current undesired levels of the aforementioned constituents. The Permittee has failed to follow BMPs as outlined in its 1997 engineering report. The Permittee will be required to reevaluate its BMPs as part of the updated O&M and engineering report.

Figure 6 is a plot of the annual average nitrate and chloride concentrations detected over the course of the permit term. The right y-axis depicts the total amount wastewater or irrigation water applied in MG. The profile of TDS concentrations tracks the same as nitrate and chloride however; the scale is ten times greater in concentration. Therefore, for better clarity TDS has been excluded from the plot.

Figure 6: A comparison of lysimeter constituent response to wastewater load and irrigation delivery with winter discharges depicted.



SOILS

The soil data have been hard to interrupt due to problems with inconsistent reporting and changing laboratories. The only clear trend is Total Kjeldahl Nitrogen, (TKN), where levels have increased with time by as much as 90% at the SW corner of Circle #7. There also appears to be an uneven distribution of TKN within Circle #7 where the SE corner increased only by 27%. One observation to be made from this is that the West half of Circle7 experiences ponding more frequently than the East half. Overall the ponding and/or the observed uneven distribution of TKN may be attributable to soil differences within the circle with clay and silts being more prevalent in one area than another.

MONITORING REQUIREMENTS

Monitoring, recording, and reporting are specified to verify that the treatment process is functioning correctly, that ground water criteria are not violated, and that effluent limitations are being achieved (WAC 173-216-110).

WELL WATER MONITORING

The monitoring of ground water at the site is required in accordance with the Ground Water Quality Standards, Chapter 173-200 WAC. The Department has determined that this discharge has a potential to pollute the ground water.

Mercer Water Users Association Well #2, (aka Karma Water District Well) quarterly monitoring schedule is detailed in the permit under Special Condition S2.A:

Parameter	**Units**	**Frequency**	**Sample Type**
Total Dissolved Solids	mg/L	Quarterly	Grab
Specific conductance	mho/cm @ 25° C	Quarterly	Grab
Chloride	mg/L	Quarterly	Grab
Sulfate	mg/L	Quarterly	Grab
Nitrate	µg/L	Quarterly	Grab
Manganese	µg/L	Quarterly	Grab
Total Iron	µg/L	Quarterly	Grab

WASTEWATER MONITORING

The wastewater monitoring schedule is detailed in the permit under Special Condition S2.B specified monitoring frequencies take into account the quantity and variability of the discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring.

Flows

The Permittee is required to monitor flow into the sedimentation pond and wastewater discharge to the sprayfield on a weekly basis. Previous problems necessitate that the Permittee to improve acquisition of these data as outlined in Special Condition, S2.F.

Wastewater Quality

The Permittee is required to monitor the following parameters at the discharge pipe into the **Sedimentation Pond** at the indicated frequencies in Special Condition S2.B.1.:

Parameter	Units	Sample Point	Sampling Frequency	Sample Type
Flow	MG	[a]	Continuous	Cumulative from 1st of month
Total Dissolved Solids (TDS)	mg/L	[a]	Twice per month	Grab
Fixed Dissolved Solids (FDS)	mg/L	[a]	Twice per month	Grab
Specific Conductance	mho/cm @ 25° C	[a]	Twice per month	Grab
pH	Standard Units	[a]	Twice per month	Grab
Total Kjeldahl Nitrogen (TKN, as N)	mg/L	[a]	Twice per month	Grab
Nitrate	mg/L	[a]	Twice per month	Grab
Chloride	mg/L	[a]	Twice per month	Grab
Sodium	mg/L	[a]	Twice per month	Grab

[a] Sample point will be at the discharge pipe to the sedimentation pond, or as close as practical.

The Permittee is required to monitor the following parameters at the **Pivot** onto the **Sprayfield** at the indicated frequencies in Special Condition S2.B.2.:

Parameter	Units	Sample Point	Sampling Frequency	Sample Type
Flow	MG	[a]	Continuous	Cumulative from 1st of month
Soluble BOD_5	mg/L	[a]	Twice per month	Grab
Total Dissolved Solids (TDS)	mg/L	[a]	Twice per month	Grab
Fixed Dissolved Solids (FDS)	mg/L	[a]	Twice per month	Grab
Specific Conductance	mho/cm @ 25° C	[a]	Twice per month	Grab
pH [b]	Standard Units	[a]	Twice per month	Grab
Total Kjeldahl Nitrogen (TKN, as N)	mg/L	[a]	Twice per month	Grab
Nitrate	mg/L	[a]	Twice per month	Grab
Chloride	mg/L	[a]	Twice per month	Grab
Sodium	mg/L	[a]	Twice per month	Grab

[a] Sample point shall be as close as practical prior to wastewater application to the sprayfield.
[b] Field test

Vadose Zone Monitoring

Sprayfields will be managed to ensure that soil moisture remains between field capacity and wilting point in accordance with Appendix A. Suction lysimeters will be used to sample and evaluate the quality of soil water.

At least three lysimeters will be installed in each sprayfield. If sprayfield circles are subdivided, three lysimeters will be installed in each subfield. Lysimeters will be charged each month. If water reaches the sampling point (approximately 5 feet) the suction will pull some of the soil water into the lysimeter. Lysimeter samples will be composited and analyzed for the parameters in Special Condition S2.C.:

Parameter	Units	Sample Point	Sampling Frequency	Sample Type
Nitrate-nitrogen (NO_3-N)	mg/L	Lysimeter	Once per month	Composite
TKN	mg/L	Lysimeter	Once per month	Composite
Total Phosphorus	mg/L	Lysimeter	Once per month	Composite
TDS	mg/L	Lysimeter	Once per month	Composite
FDS	mg/L	Lysimeter	Once per month	Composite
Alkalinity	mg/L	Lysimeter	Once per month	Composite
Chloride	mg/L	Lysimeter	Once per month	Composite
pH[a]	mg/L	Lysimeter	Once per month	Composite
Specific Conductance	mho/cm @ 25° C	Lysimeter	Once per month	Composite

[a] Field Test

For any of the above monitoring sites and frequencies the Permittee may request the Department of Ecology review the data to determine whether a reduction in the sampling frequency is warranted after 12 months of monitoring.

The Department requires this monitoring data to make informed decisions to protect ground water quality.

Flow measurements will be integrated with water quality data to calculate the total loading of constituents to the sedimentation pond and each field.

In the event discharges to the sedimentation pond do not occur during a calendar month, the Permittee will write, "No discharge" in place of monitoring results on the monthly Discharge Monitoring Report.

ANNUAL SOIL MONITORING

The Permittee is required perform soil monitoring once each year on the sprayfield lands. The sampling sites are to be located as to be representative of each irrigated field or subfield. Samples will be taken from at least 4 individual sample sites in each field or subfield. Samples shall be composited according to depth from the corresponding individual samples. If possible, sampling sites shall remain in the same vicinity from year to year.

The Permittee shall monitor the crop sprayfield soils according to the following schedule contained in Special Condition S2.D:

Parameter	Units	Sample Type	Depth Increments [a, b]
Organic matter	%	Composite	1
TKN (as N)	mg/Kg	Composite	1
Cation exchange capacity	meq/100g	Composite	1 & 4
SO_4	mg/Kg	Composite	1 & 4
Total Phosphorus (as P)	mg/Kg	Composite	1 & 4
Calcium	mg/ Kg	Composite	1 & 4
Magnesium	mg/ Kg	Composite	1 & 4
Sodium	mg/ Kg	Composite	1 & 4
Potassium	mg/Kg	Composite	1 & 4
Ph	S. U.	Composite	1 & 4
Bicarbonate (HCO_3)	mg/Kg	Composite	1 & 4
NO_3 (as N)	mg/Kg	Composite	1, 2, 3, 4
Chloride	mg/Kg	Composite	1, 2, 3, 4
Specific conductance	mho/cm @ 25° C	Composite	1, 2, 3, 4

[a] Depth increments in inches: 1= 0 -12", 2 = 12-24", 3 = 24-36", 4 = 36-48"
[b] Samples shall be taken to the indicated depths, or until auger refusal.

After the second year of operation Mercer may request to revise the sampling plan. Request for reduction in monitoring frequencies may be granted at the Department's discretion.

OTHER PERMIT CONDITIONS

REPORTING AND RECORDKEEPING

The conditions of S3. are based on the authority to specify any appropriate reporting and recordkeeping requirements to prevent and control waste discharges (WAC 273-216-110).

FACILITY LOADING

Sedimentation Pond

The engineering report correctly anticipated that wastewater discharged from the processing plant will be less than crop moisture requirements for the months of July, August, September and October. (Surface water and ground water will augment wastewater flow.) Excess wastewater flows during September and November will be stored in the sedimentation pond to fulfill the

needs of winter crops. Appendix B of the engineering report states that the full storage capacity of the sedimentation pond, approximately 17.2 million gallons (or 52.8 acre feet), will be reached at a processing plant effluent flow of 600 gallons per minute. The engineering report states that, at a rate of 600 gpm, the maximum design flow into the sedimentation pond will be:

Maximum flow:	864,000 gallons/day

Sprayfields

The design criteria for sprayfield treatment of process wastewater will vary according to the crop grown, onsite soil conditions, and seasonal weather patterns. Appendix B, page B1, mentions four possible crops that facility managers can grow: winter wheat, spring wheat, sweet corn, and "corn used for grain." Rather than forecasting specific sprayfield loading criteria for different possible scenarios in this fact sheet, the annual irrigation and crop management report is a more appropriate format to address onsite conditions and needs.

The engineering report does not quantify the assimilative capacity of the sprayfield for soluble BOD, because this value can vary greatly depending on a variety of factors, including soil moisture, the crop being grown, barometric pressure, etc.

In addition, because irrigation water is a primary transport vehicle of soluble BOD, the maximum hydraulic loading expected to be applied to the sprayfields is also listed. The engineering report states that each sprayfield circle will require a maximum of 122 million gallons of water during the growing season, depending on the crop grown and weather conditions (Appendix B, pg. B2).

The irrigation pump at the sedimentation pond and the center pivot sprinkler system are typically set to operate at a rate of 970 gpm. A full rotation of the center pivot sprinkler system around a circle takes approximately 24 hours. A pump rate of 970 gpm over a 24 hour period equals a total of 1,396,800 gallons, or 11,174.4 gallons per acre per day of wastewater.

The guiding principal of sprayfield loading is that exceeding application of nutrients at agronomic rates is prohibited. The permit requires the Permittee to maintain adequate capacity to treat the flows and waste loading to the treatment plant (WAC 173-216-110[4]). For significant changes in loadings to the treatment works, the permit requires a new application and an engineering report (WAC 173-216-110[5]).

The Loading Limitations have been set at:

Average loading of soluble BOD	32 lbs/acre/day
Average hydraulic loading	15,000 gal/acre/day

IRRIGATION AND CROP MANAGEMENT REPORT

The annual irrigation and crop management report is required to support the engineering report and Operations and Maintenance Manual. This plan shall include a consideration of wastewater application at agronomic rates and should describe and evaluate various irrigation controls. Anticipated nutrient and hydraulic loading rates must be described to the extent possible. The Permittee is required to submit a plan to the Department for each upcoming year before March 15th.

The purpose of this report is to develop a wastewater application strategy for the protection of the groundwaters of the State. This report shall at a minimum address:

- Any trends disclosed from close examination of the results from the soil and lysimeter monitoring for the past year , which could impact groundwater quality, and;
- develop the next season's planting and irrigation schedule to minimize pollution and/or address potential contamination as indicated in the findings.

ENGINEERING REPORT UPDATE

The Permittee is required to update its engineering report. The decision is based on the findings discussed earlier in this Fact sheet. The report is due at the Department no later than **July 15, 2006**. The updated report at a minimum is to address:

- AKART analysis with special attention to pollutant source reduction;
- A reevaluation of the potential for groundwater contamination at the sprayfield and sedimentation pond;
- Development of BMPs to reduce levels of TDS, nitrate and chloride below the Vadose Zone;
- Elimination of non-beneficial applications of wastewater;
- Characterize the cation/anion balance in the FDS fraction of TDS;
- Develop a monitoring plan and schedule which will assure representative sampling during all phases of operation.

OPERATIONS AND MAINTENANCE MANUAL UPDATE

The permit contains Special Condition S6. as authorized under RCW 90.48.110, and WAC 173-240-150. It is included to ensure proper operation and regular maintenance of equipment, and to ensure that adequate safeguards are taken so that constructed facilities are used to their optimum potential in terms of pollutant capture and treatment.

As discussed earlier in this fact sheet a number of concerns have risen which will require some changes in the operation at Mercer Ranch. Some of these concerns will require in depth study

and analysis to resolve, and for this reason an update to the engineering report is required in approximately 3 years from this writing. There is however measures the Permittee can take in the short term which will mitigate or resolve some of these concerns. The Department expects amendments to the O & M manual to be submitted as these changes are developed by the Permittee prior to submittal of the updated engineering report.

The water balance for the last permit demonstrates change in operation and maintenance is required immediately in order to establish reliable monitoring of flow. Therefore the Permittee is required to install flow meters and incorporate into its O & M the procedures for their proper maintenance within **90 days following permit renewal**.

Other concerns of the Department are:

- Winter applications of wastewater to the sprayfield, and;
- method to address the apparent infiltration and inflow of stormwater into the sedimentation pond, and;
- a quick response to an increasing concentration of contaminants discovered in the lysimeters, and;
- collation, analysis and format of the monitoring data submitted to the Department.

SOLID WASTE PLAN

The Department has determined that the Permittee has a potential to cause pollution of the waters of the state from leachate of solid waste.

Special Condition S8. of this permit requires, under authority of RCW 90.48.080, that the Permittee develop and submit to the Department a solid waste plan to prevent solid waste from causing pollution of waters of the state. The plan must also be submitted to the local solid waste permitting agency for approval, if required.

SPILL PLAN

The Department has determined that the Permittee stores a quantity of chemicals that have the potential to cause water pollution if accidentally released. The Department has the authority to require the Permittee to develop best management plans to prevent accidental release under section 402(a)(1) of the Federal Water Pollution Control Act (FWPCA) and RCW 90.48.080. Special Condition S9. of this permit requires the Permittee to update their plan for preventing the accidental release of pollutants to state waters and for minimizing damages if such a spill occurs.

The Permittee has developed a plan for preventing the accidental release of pollutants to state waters and for minimizing damages if such a spill occurs. The permit requires the Permittee to update this plan and submit it to the Department.

GENERAL CONDITIONS

General Conditions are based directly on state laws and regulations and have been standardized for all industrial waste discharge to ground water permits issued by the Department. Condition G1. requires responsible officials or their designated representatives to sign submittals to the Department. Condition G2. requires the Permittee to allow the Department to access the treatment system, production facility, and records related to the permit. Condition G3. specifies conditions for modifying, suspending or terminating the permit. Condition G4. requires the Permittee to apply to the Department prior to increasing or varying the discharge from the levels stated in the permit application. Condition G5. requires the Permittee to construct, modify, and operate the permitted facility in accordance with approved engineering documents. Condition G6. prohibits the Permittee from using the permit as a basis for violating any laws, statutes or regulations. Conditions G7. and G8. relate to permit renewal and transfer. Condition G9. requires the payment of permit fees. Condition G10. describes the penalties for violating permit conditions.

RECOMMENDATION FOR PERMIT ISSUANCE

This permit meets all statutory requirements for authorizing a wastewater discharge, including those limitations and conditions believed necessary to control toxics, and to protect human health and the beneficial uses of waters of the State of Washington. The Department proposes that the permit be issued for five (5) years.

REFERENCES FOR TEXT AND APPENDICES

Faulkner, S.P., Patrick Jr., W.H., Gambrell, R.P., May-June, 1989. Field Techniques for Measuring Wetland Soil Parameters, Soil Science Society of America Journal, Vol. 53, No.3.

Washington State Department of Ecology, 1993. Guidelines for Preparation of Engineering Reports for Industrial Wastewater Land Application Systems, Ecology Publication # 93-36. 20 pp.

Washington State Department of Ecology, 1996. Implementation Guidance for the Ground Water Quality Standards, Ecology Publication # 96-02. 135 pp.

Washington State University, November, 1981. Laboratory Procedures - Soil Testing Laboratory. 38 pp.

APPENDIX A -- PUBLIC INVOLVEMENT INFORMATION

The Department has tentatively determined to issue a permit to the applicant listed on page 1 of this fact sheet. The permit contains conditions and effluent limitations which are described in the rest of this fact sheet.

Public notice of application was published on July 25, 2002 in the White Salmon Enterprise and the Goldendale Sentinel to inform the public that an application had been submitted and to invite comment on the reissuance of this permit.

The Department published a Public Notice of Draft (PNOD) on June 25, 2003 in the Prosser Record Bulletin to inform the public that a draft permit and fact sheet are available for review upon request. Interested persons are invited to submit written comments regarding the draft permit. The draft permit, fact sheet, and related documents are available for inspection and copying between the hours of 8:00 a.m. and 5:00 p.m. weekdays, by appointment, at the regional office listed below. Written comments should be mailed to:

Water Quality Permit Coordinator
Department of Ecology
Central Regional Office
15 West Yakima Avenue, Suite 200
Yakima, WA 98902

Any interested party may comment on the draft permit or request a public hearing on this draft permit within the thirty (30) day comment period to the address above. The request for a hearing shall indicate the interest of the party and reasons why the hearing is warranted. The Department will hold a hearing if it determines there is a significant public interest in the draft permit (WAC 173-216-100). Public notice regarding any hearing will be circulated at least thirty (30) days in advance of the hearing. People expressing an interest in this permit will be mailed an individual notice of hearing.

The Department will consider all comments received within thirty (30) days from the date of public notice of draft indicated above, in formulating a final determination to issue, revise, or deny the permit. The Department's response to all significant comments is available upon request and will be mailed directly to people expressing an interest in this permit.

Further information may be obtained from the Department by telephone, (509) 457-7105, or by writing to the address listed above.

This fact sheet and permit was written by Rich Marcley

APPENDIX B -- GLOSSARY

Ambient Water Quality--The existing environmental condition of the water in a receiving water body.
Ammonia--Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.
Best Management Practices (BMPs)--Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the State. BMPs include treatment systems, operating procedures, and practices to control: plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.
BOD_5--Determining the Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD_5 is used in modeling to measure the reduction of dissolved oxygen in a receiving water after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.
Bypass--The intentional diversion of waste streams from any portion of the collection or treatment facility.
Compliance Inspection - Without Sampling--A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations.
Compliance Inspection - With Sampling--A site visit to accomplish the purpose of a Compliance Inspection - Without Sampling and as a minimum, sampling and analysis for all parameters with limits in the permit to ascertain compliance with those limits; and, for municipal facilities, sampling of influent to ascertain compliance with the 85 percent removal requirement. Additional sampling may be conducted.
Composite Sample--A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing discrete samples. May be "time-composite"(collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots.
Construction Activity--Clearing, grading, excavation and any other activity which disturbs the surface of the land. Such activities may include road building, construction of residential houses, office buildings, or industrial buildings, and demolition activity.
Distribution Uniformity--The uniformity of infiltration (or application in the case of sprinkle or trickle irrigation) throughout the field expressed as a percent relating to the average depth infiltrated in the lowest one-quarter of the area to the average depth of water infiltrated.

Engineering Report--A document, signed by a professional licensed engineer, which thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report shall contain the appropriate information required in WAC 173-240-060 or 173-240-130.
Grab Sample--A single sample or measurement taken at a specific time or over as short period of time as is feasible.
Industrial Wastewater--Water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business, from the development of any natural resource, or from animal operations such as feed lots, poultry houses, or dairies. The term includes contaminated storm water and, also, leachate from solid waste facilities.
Maximum Daily Discharge Limitation--The highest allowable daily discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. The daily discharge is calculated as the average measurement of the pollutant over the day.
Method Detection Level (MDL)--The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is above zero and is determined from analysis of a sample in a given matrix containing the analyte.
pH--The pH of a liquid measures its acidity or alkalinity. A pH of 7 is defined as neutral, and large variations above or below this value are considered harmful to most aquatic life.
Quantitation Level (QL)-- A calculated value five times the MDL (method detection level).
Soil Scientist--An individual who is registered as a Certified or Registered Professional Soil Scientist or as a Certified Professional Soil Specialist by the American Registry of Certified Professionals in Agronomy, Crops, and Soils or by the National Society of Consulting Scientists or who has the credentials for membership. Minimum requirements for eligibility are: possession of a baccalaureate, masters, or doctorate degree from a U.S. or Canadian institution with a minimum of 30 semester hours or 45 quarter hours professional core courses in agronomy, crops or soils, and have 5,3,or 1 years, respectively, of professional experience working in the area of agronomy, crops, or soils.
State Waters--Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, and all other surface waters and watercourses within the jurisdiction of the State of Washington.
Stormwater--That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a storm water drainage system into a defined surface water body, or a constructed infiltration facility.
Technology-based Effluent Limit--A permit limit that is based on the ability of a treatment method to reduce the pollutant.
Total Coliform Bacteria--A microbiological test which detects and enumerates the total coliform group of bacteria in water samples.
Total Dissolved Solids--That portion of total solids in water or wastewater that passes through a specific filter.
Total Suspended Solids (TSS)--Total suspended solids is the particulate material in an effluent. Large quantities of TSS discharged to a receiving water may result in solids accumulation.

Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

Water Quality-based Effluent Limit--A limit on the concentration of an effluent parameter that is intended to prevent pollution of the receiving water.

APPENDIX C -- TECHNICAL CALCULATIONS

HYDRAULIC AND BOD_5 SPRAYFIELD LOADING CALCULATIONS

Hydraulic Loading

The system that conveys and applies wastewater from the sedimentation pond to the sprayfields operates optimally at a rate of 970 gallons per minute (gpm). The total quantity of wastewater applied to a 125 acre sprayfield over a 24 hour period was calculated as follows:

970 gpm × 60 min/hr × 24 hrs/day = 1,396,800 gallons per day (gpd)

The hydraulic loading rate was calculated as follows:

1,396,800 gpd ÷ 125 acres = 11,174.4 gallons per acre per day (gal/acre/day)

Over a typical cycle of 5 days of wastewater application and 5 days of irrigation with fresh water or no irrigation, the average hydraulic loading of wastewater will be:

11,174.4 gal/acre/day ÷ 2 = 5,587.2 gal/acre/day

BOD_5 Loading

The average concentration of BOD_5 in the wastewater was reported in the application as 604 mg/l, or 0.604 grams per liter (g/l). BOD_5 loading of a 125 acre sprayfield was calculated using the following process.

First, the hydraulic loading rate was converted from gallons to liters:

5,587.2 gal/acre/day × 3.7854 liters/gal = 21,149.786 liters/acre/day

Then, the BOD_5 loading rate was calculated:

21,150 liters/acre/day × .604 g/l (BOD_5) = 12,774.6 g/acre/day

Finally, the above loading rate was converted to pounds per acre per day:

12,774.6 g/acre/day ÷ 453.59 g/lb = 28.2 lbs/acre/day of BOD_5

APPENDIX D -- RESPONSE TO COMMENTS

Comment received from:

Daryl D. Burnett
Engineering Manager
Mercer Ranches
46 Sonova Rd.
Prosser, WA 99350

Mercer Comment: Permit Change to read.

Page 18 of 23, S7.A. Design Criteria

> *Flows or waste loadings of the following design criteria for the permitted Treatment facility shall not exceed:*

Average flow applied to sprayfields(s)	*15,000 gallons/acre/day*
Average soluble BOD5 applied to sprayfield(s)	*32 lbs/acre/day*

Department response:

Changed accordingly.

Mercer Comment: Fact sheet Change to read.

Page 15 of 40, Sprayfield Loading, first paragraph, first sentence

Using the Best Professional Judgment of the Department, it is believed that an average application rate of 15,000 gallons per acre per day and 32 lbs/acre/day soluble BOD will allow crop management flexibility; yet provide protection of ground water.

Department response:

Changed to Read:

Using the Best Professional Judgment of the Department, it is believed that an average application rate of 15,000 gallons/acre/day and 32 lbs/acre/day soluble BOD5 will allow crop management flexibility; yet provide protection of ground water.

Mercer Comment: Fact sheet Change to read.

Page 16 of 40, Table 2: Technology-based Limitations

MRI recommends footnotes "a" and "b" should be attached to the Average Monthly Limitation(s) of 15,000 gallons/acre/day and 32 lbs/acre/day.

Department response:

Footnotes added as per request.

Mercer Comment: Fact sheet Change to read

Page 30 of 40, Sprayfields

The Loading Limitations have been set at:

Average loading of soluble BOD5	*32 lbs/acre/day*
Average hydraulic loading	*15,000 gallons/acre/day*

Department response:

Changed accordingly.